Original Article

Implementation Of Clinical Pathway For Management of COPD Exacerbation

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Abstract

Background: The effectiveness for reducing the length of stay and produce better outcomes has been applied with the use of the clinical pathway. In this study, we observe the implementation of clinical pathways (CP) and evaluate their effectiveness in the management of Chronic Obstructive Pulmonary Diseases (COPD) exacerbation in Goenawan Partowidigdo Pulmonary Hospital (RSPG) Cisarua Bogor.

Method: This research is a quantitative study with an analytical survey method and cross-sectional design. Data collection was carried out by studying documentation on 304 medical record files from early 2019 to July 2020 and clinical pathway forms.

Results: There were differences in clinical outcomes before and after the implementation of CP. The difference in the overall mean length of stay (LOS) using CP were 4 days while the who did not use CP were 6 days. For In-Hospital Mortality (IHM) there was 1 death in the CP group, and there were no deaths in non-CP groups. As for the Readmission Rate (RR), the results of the study showed that the most RR was in the CP group, which were 6 patients (54.5%) in 1st wards, 5 patients (62.5 %) in 2nd wards and 39 patients (70.9%) in 3rd wards. These RR results showed that CP of COPD exacerbation must be evaluated further. The average total hospital rate showed a significant difference between the two clinical methods. The hospital rate variable had a very significant difference between the CP and non-CP methods, with a significant value of = 0.0001.

Conclusion: The application of CP can reduce the length of stay (LOS) and the average total hospital rate of patients who are hospitalized for COPD exacerbation. This CP must be evaluated further to reduce the readmission.

Keywords: clinical pathway, COPD exacerbation

INTRODUCTION

The main objective of implementing the clinical pathway is to select best practice patterns from a wide variety of practice patterns, establish expected standards regarding the length of care and use of clinical procedures. In addition, the implementation of clinical pathways can be used to assess the relationship between various stages and conditions different in a process and develop strategies to produce faster services with fewer stages.[1,2]

Chronic Obstructive Pulmonary Diseases (COPD) exacerbation are

characterized by acute patient symptoms such as shortness of breath (dyspnea), cough, and/or purulent sputum, which may improve with routine medication. *The GOLD Report* 2014 explains that the cost for health due to COPD is 56% of the total cost to be paid for respiratory diseases. The highest costs are caused by the incidence of exacerbations of this disease.[3] The incidence of this disease increases with increasing age and is higher in men (4.2%) than in women (3.3%).[4]

METHOD

The type of this research is quantitative with survey analytic method and cross-sectional.[5] This research was conducted retrospectively and analyzed descriptively, namely the method of problem-solving which was investigated by describing the current state of the subject or research object based on visible facts or as they are. The medical record of Goenawan Partowidigdo Pulmonary Hospital (RSPG) files used in this study was from the beginning of 2019 to July 2020. The materials used were notes or data on the medical record card taken from RSPG Cisarua which is related to COPD. The data collection technique used a documentation study of 304 medical record files and clinical pathway (CP) forms.

The samples for COPD patients with the implementation of clinical pathways were 152 medical record files and for COPD patients without the implementation of the CP were 152 medical record files. The data analysis method used in this research is quantitative analysis. The hospital outcome analysis was in the form of Length of Stay (LOS) using Mann-Whitney, while the readmission rate (RR) and in-hospital mortality (IHM) used chi-square. Analysis of the outcome of the economy in the form of the total real costs of the two groups using Mann-Whitney.

RESULT

The results of the statistical analysis of the Mann Whitney difference test were obtained, which showed a very significant difference between the LOS with the CP method with LOS non-CP (P=0.0001). The results of the analysis showed that the average LOS for class 1 using CP was 3.64 days, 1.94 days more efficient than non-CP. Other parameters are IHM and RR, the results of the analysis of the two groups showed P>0.05, this indicates that there was no significant difference between the two groups.

The average total hospital rate per patient is relatively the same and does not show a statistically significant difference between the two clinical methods (Table 2.) However, in the RS rate variable, there is a significant difference between the CP and non-CP methods (P=0.0001). The average hospital rate using the CP method were Rp 1.693.753,00 for each patient.

Likewise, the average rates of nursing, radiology, accommodation rooms and drugs using CP are significantly more efficient than non-CP. The average efficiency obtained in the nursing, radiology, accommodation room and

medicine variables were Rp. 318,373,00, Rp. 27,717,00, Rp. 698,642,00 and Rp. 317,286,00 per patient.

Table 1. Comparison Results of Hospital Outcomes in Class 1 Inpatients with Exacerbation of COPD Cases in RSPG with CP and Non-CP in 2019

Outcome RS	Mean		P
	CP	Non CP	
LOS	3,64	5,58	0,0001**
IHM	0 (0%)	0 (0%)	0,277*
RR	6 (54,5%)	5 (45,5%)	0,539*

Note:
*Chi Square Test of significance 0,05
**Mann-Whitney Test of significance 0,05
LOS = Length of Stay; IHM = In-Hospital Mortality; RR = Readmission Rate

From Table 3, the statistical analysis results are obtained. Mann Whitney difference test, which shows a significant difference between the length of stay (LOS) with the CP and non-CP (P=0.0001). The results of the analysis show that the average LOS for class 2 using CP is 3.95 days, 1.65 days more efficient than non-CP. Other parameters are IHM and RR, the results of the analysis of the two groups showed P>0.05, this indicates that there was no significant difference between the two groups.

The RS rate variable has a significant difference between the CP and non-CP methods (P=0.002). The average hospital rate using the CP method can be streamlined as much as Rp. 1,086,813,00 per patient. The average efficiency obtained in the nursing variable, accommodation room and medicine, each of Rp. 208,285,00, Rp. 516,304,00 and Rp. 418,964,00 per patient.

Table 3. Comparison Results of Hospital Outcomes in Class 2 Inpatients with Exacerbation of COPD Cases in RSPG with CP and Non-CP in 2019 to 2020

Outcome RS	Mean		P
	CP	Non CP	
LOS	3,95	5,60	0.0001**
IHM	1 (100%)	0 (0%)	0,317*
RR	5 (62,5%)	3 (37,5%)	0,315*

Note:
*Chi Square Test 0.05 significance
**Mann-Whitney Test significance 0,05
LOS = Length of Stay; IHM = In-Hospital Mortality; RR = Readmission Rate

Table 5 showed the significant difference between the LOS with the CP method and non-CP. The results of the analysis show that the average length of time treated (LOS) for class 3 using CP is 4.12 days, 1.48 days more efficient than non-CP. Other parameters are IHM and RR, the results of the analysis of mortality rates for the two groups showed that there was no significant difference between the two groups.

Table 5. Comparison Results of Hospital Outcomes in Class 3 Inpatients with Exacerbation of COPD Cases in RSPG with CP and Non-CP in 2019 to 2020

Outcome RS	Mean		P
	CP	Non-CP	
LOS	4.12	5,58	0.000**
IHM	0 (0%)	0 (0%)	0,317*
RR	39 (70,9%)	16 (29,1%)	0,001*

Note:
*Chi Square Test 0.05 significance
**Mann-Whitney Test significance 0,05
LOS = Length of Stay; IHM = In-Hospital Mortality; RR = Readmission Rate

While the results of repeated analysis of patients from two groups showed P<0.05, this indicates that there was a significant difference between the two groups.

Table 2. Comparison Results of Economic Output in Class 1 Inpatients with Exacerbation of COPD Cases in RSPG with CP and Non-CP in 2019 to 2020

Variable	Mean		Mann-Whitney Statistical Value	P
	CP (N=25)	Non-CP (N=29)		
Total Tariff / INA CBGs (Rp)	7.248.008	7.066.041	303.50	0.292
Hospital Rates (Rp)	4.018.783	5.712.536	158.00	0.000
Non-Surgical Procedure (Rp)	14.400	10.344	360.00	0.895
Surgical Procedures	0	0	362.50	1.000
Experts	1.680	0	333.50	0.124
Nursing	617.920	936.293	237.50	0.030
Support	18.400	17.448	356.50	0.901
Radiology	104.800	132.517	250.50	0.037
Laboratory	485.360	510.465	358.00	0.938
Rehabilitation	27.600	82.241	273.50	0.066
Accommodation Room	782.000	1.480.642	129.00	0.000
Drug	1.540.444	1.857.730	246.00	0.043
BMHP	36.728	88.629	324.00	0.497
Difference in Fare	3.229.224	1.353.505	181.00	0.002

Table 4. Comparison Results of Economic Outcomes in Class 2 Inpatients with COPD Exacerbations in RSPG with CP and Non CP in 2019 to 2020

Variable	Mean		Mann-Whitney Statistical Value	P
	CP	Non-CP		
Total Tariff / INA CBGs (Rp)	5.749.135	6.211.465	201.00	0.469
Hospital Rates (Rp)	3.449.298	4.536.111	104.00	0.002
Non-Surgical Procedure (Rp)	0	0	230.00	1.000
Surgical Procedures	0	0	230.00	1.000
Experts	1.000	2.608	211.50	0.371
Nursing	452.475	660.760	137.00	0.024
Support	69.950	29.086	181.00	0.195
Radiology	123.350	113.913	219.00	0.766
Laboratory	549.025	542.826	208.50	0.601
Rehabilitation	28.250	69.782	190.00	0.252
Accommodation Room	500.000	1.016.304	68.50	0.000
Drug	1.118.612	1.537.576	149.00	0.049
Medical equipment	135.237	85.860	149.00	0.045
Difference in Fare	2.299.837	1.675.354	170.00	0.144

Table 6. Comparison Results of Economic Outcomes in Class 3 Inpatients with COPD Exacerbations in RSPG with CP and Non CP in 2019 to 2020

Variable	Mean		Mann-Whitney Statistical Value	P
	CP	Non-CP		
Total Tariff / INA CBGs (Rp)	4.727.407	5.122.443	435.10	0.018
Hospital Rates (Rp)	2.842.839	3.797.202	317.20	0.000
Non-Surgical Procedure (Rp)	8.971	1.440	530.25	0.594
Surgical Procedures	0	0	535.50	1.000
Experts	626	560	528.90	0.654
Nursing	446.476	624.065	367.60	0.000
Support	25.794	26.300	504.00	0.418
Radiology	74.018	66.700	532.00	0.939
Laboratory	315.757	385.785	452.00	0.057
Rehabilitation	18.317	19.780	533.90	0.971
Accommodation Room	322.429	439.000	354.00	0.000
Drug	1.127.951	1.613.050	325.00	0.000
Medical equipment	95.323	158.504	463.10	0.093
Difference in Fare	1.884.568	1.325.241	435.00	0.021

Table 6 shows the average total hospital rate per patient showed a significant between the two groups, and the RS rate variable also has a significant difference between the CP and non-CP methods. Meanwhile, the average hospital rate using the CP method can be streamlined as much as Rp. 954,363,00 per patient.

Case analysis of patients in the inpatient room class 3 in 2019 to July 2020, was carried out on 17 variables, with an average of nursing variables, accommodation rooms, drugs and difference in rates which showed a significant difference between CP and non-CP.

Likewise, the average nursing rates, accommodation rooms and drugs using CP are significantly more efficient than non-CPs. The average efficiency obtained in the nursing variable, accommodation room and medicine, each of Rp. 177,589,00, Rp. 116,571,00 and Rp. 485,099,00 per patient.

DISCUSSION

In this study, we compared the results (LOS, RR and IHM) of patients treated using CP and non-CP from medical record data from 2019 to 2020. This study proves the hypothesis that the use of CP in the management of COPD exacerbation reduces the duration of hospitalization (LOS). We found a significant reduction in LOS in the CP group compared to the non-CP group in inpatients class 1, 2 and 3. The overall mean LOS of exacerbated COPD patients using CP was 4 days while the overall mean LOS of exacerbated COPD patients who did not use CP is 6 days. A study by Andrea et al., who utilized exacerbation of COPD, also showed a significant reduction in the mean length of stay of 5 days in the CP group and 7 days in the non-CP group.[6] The same study was also conducted by Santamaria showing efficiency of 0.89 days (13.2%) of staying in the hospital using CP.[7] A retrospective study by Celis et al. (2011) also showed a significant decrease in LOS.[8]

This suggests that the implementation of CP can reduce the length of stay for patients in the hospital. and will also directly reduce the cost of care. Several things that cause the LOS value in patients to belong include age, disease severity and the presence of comorbidities.[9] These data are insufficient to demonstrate the optimal duration of hospitalization in patients with exacerbation of COPD. A study on the length of hospital stay required for COPD exacerbation was conducted by Mushlin *et al*. found that 6.9 days was considered the mean LOS.[10] The mean LOS that the investigators found was considered effective and efficient because it was past the average recommended antibiotic use period (3 to 7 days) of the GOLD guideline.[11] This study shows that treating exacerbated COPD patients using CP can help reduce the length of stay and indirectly reduce patient care costs.

Another parameter is IHM. The results of the analysis of the two groups showed that there was no significant difference between the two groups. There

was only one patient death in the CP group, namely in the class 2 patient and there was no death in class 1 and 3 in both the CP and non-CP groups. The risk of death in the hospital was independently associated with patient-related factors such as age, presence of respiratory acidosis and CCI.[12] COPD will have a negative impact on the quality of life of patients, including patients aged >40 years will cause the sufferer's disability. Even though they are still in the productive age group but cannot work optimally because of chronic shortness of breath. Comorbidity of COPD will result in cardiovascular disease, bronchial cancer, lung infections, thromboembolism disorder, asthma, hypertension, osteoporosis, joint pain, depression and anxiety.[13]

COPD mortality is higher in males and will increase in the >45 years age group. This could be attributed to decreased respiratory function at the age of 30-40 years 29. Research in America states that COPD is associated with a risk of death which is defined as the hazard ratio (HR).[13] Apart from the death of the patient in the hospital during treatment, the clinical outcome analyzed was the RR. Researchers did not find a significant difference in recurrent patient admission or RR between the two groups in class 1 and 2.

Whereas RR in grade 3 patients showed a significant difference between the CP and non-CP groups. The results showed that the most RR was in the CP group, both in grade 1, 2 and 3. As many as 6 patients (54.5%) in class 1, 5 patients (62.5%) in grade 2 and 39 respectively. patients (70.9%) were in grade 3. The main reason for re-entry in this study was shortness of breath.[6] The factors that cause the number of patients to return to the hospital are due to the presence of single or multiple comorbidities, inadequate therapy in the CP group patients, the comparison of the number of specialist doctors with the number of exacerbated COPD patients and the inadequate management of COPD exacerbations, for example, such as treatment of patients that have not been completed.[14]

The mean total hospital rates per patient showed a significant difference between the two clinical methods in both grades 1, 2 and 3 ($P<0.05$). In addition, the RS rate variable also has a significant difference between the CP and non-CP methods, with a significance value $P<0.0001$. The average hospital rate using the CP method can be streamlined as much as Rp. 1,693,753,00 per patient in class 1, Rp. 1,086,813,00 per patient in class 2 and Rp. 954,363,00 per patient. With these results, it can be concluded that the application of CP can reduce the cost of treatment.[2]

Another reason related to the implementation of the clinical pathway is the implementation of the National Health Insurance (Jaminan Kesehatan Nasional/JKN) system that has been implemented since January 2014 by the Health Insurance Management Agency (Badan Penyelenggara Jaminan Sosial/BPJS) using the Indonesian Cased Based Groups (INA-CBGs) tariff. The application of the tariff for the INA CBGs

package requires hospital management to be able to save costs and optimize hospital financial management, as well as carry out quality control, cost control and access through calculating the cost of care based on the calculation of unit costs owned by the hospital.[2] Implementation of CP is an interesting discussion among health workers.

The results of other studies show that there is budget efficiency (cost reduction) after the implementation of clinical pathways.[15] This is in line with the review of several studies conducted by Rotter et al., the result is that the implementation of clinical pathways can reduce treatment costs by up to $US 261 from ordinary care (without clinical pathways).[16]

Some of the advantages of implementing the *clinical pathway* are the uniformity of services and the ease with which the health staff team manages patients. In developed countries such as the UK, America and Australia *clinical pathways* continue to be developed and have a positive impact on the quality of life of patients, cost efficiency and minimize variations in action. The variations that occur can be in the form of variations in action or variations in the use of drugs.[17]

CONCLUSION

There are differences in clinical outcomes before and after the implementation of clinical pathways in the treatment of exacerbation COPD disease. The difference in the overall mean length of stay of exacerbated COPD patients using CP was 4 days while the overall mean LOS of exacerbated COPD patients who did not use CP was 6 days. *In-Hospital Mortality* (IHM) there was only one patient death in the CP group, namely in the class 2 patient and there were no deaths in class 1 and 3 in both the CP and non-CP groups. As for the *Readmission Rate* (RR), the results of the study showed that the most RR was in the CP group, both in grade 1, 2 and 3 patients. 6 patients (54.5%) respectively in class 1, 5 patients (62.5 %) in class 2 and 39 patients (70.9%) in class 3. The average total hospital rate per patient shows a significant difference between the two clinical methods in both classes 1, 2 and 3. In addition, the RS rate variable also has a significant difference between the CP and non-CP methods.

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